Case 3. Generalizing multiple groups (each with multiple atomics), Row-wise generalization

Case 4. Generalizing multiple groups (each with multiple atomics), Column-wise generalization

5   Case 5. Generalizing multiple groups (each with multiple atomics), Diagonal generalization

Case 6. Generalizing multiple groups (each with generalized multiple atomics) – Nested generalization

Case 7. Generalizing any combination of atomics, groups, generalized atomics and

10   generalized groups, including multi-level nested generalization

Each one of these cases is discussed below with examples. There are a few other cases

where generalizer can also be employed, but since these are rather uncommon or exceptions, they

are not discussed here. The first case is the generalization of atomics within a single group.

Figures 8A - 8C illustrate a first generalizer example for generalizing atomics within a

15   group in accordance with the invention. For each example, the syntax of the elements is

provided, an example of the selected elements by the user and a graphical example of the

generalization occurring is shown. For example, with respect to case 1, Figure 8a illustrates a

syntax 170 for atomics within a single group. As shown, there may be a body portion that

includes a group 1 tag (<Grp1>) that includes a generalized tag (<Generalized1>) that in turn

20   includes two atomics (<Atom1> and <Atom2>).

In accordance with the invention, the user must select at least two atomics in the group to

generalize. Figure 8B illustrates user selected content 172 and generalized content 174. As shown,

the user has selected at least two atomics (e.g., "Antiques & Art" and "Books, Movies & Music") in

the group (e.g., "Categories" in this example). Figure 8C illustrates a graphical tree 176 wherein the user has selected at least two atomics (shown shaded) for one or more atomics (n in this example) within a group node 178. This is the simplest case of generalization where a single group ('Categories' in this case) consisting of a varying number of items (atomics) is generalized. In operation, a user selects two items from the list of items and puts them under a generalized tag. The generalizer algorithm then produces an XSL template which creates a RML node that gets called the number of times equal to the number of items in the group. Now, a second example of the generalization will be described that includes an example of the input file, an example of the file after generalization and the final stylesheet.

Figures 9A - 9C illustrate a second generalizer example for generalizing atomics within a group (or multiple groups) in accordance with the invention. Figure 9a illustrates a syntax 180 for generalizing atomics within multiple groups wherein a body section may include a first group 182 and a second group 184 and each group may have one or more atomics 186 as shown. As with case 1, the user may select at least two atomics from each group to generalize the group in accordance with the invention.

As shown in Figure 9b, a list of user selected content 188 and a list of generalized content 190 are shown. As stated above, the user selects at least two pieces of content from each group (e.g., "Automotive" and "Business Exchange" from the "Specialty Sites" group and "Antiques & Art" and "Books, Movies & Music" from the "Categories" group. As a results of the selection by the user, the generalized content 190 may be extracted from a web page wherein the template for each atomic in the group is called the number of times (e.g., 4 for the "Specialty Sites" group

and 14 for the "Categories" group. Figure 9C illustrates a tree representation 192 of the elements in a web page including a root node 194, two group nodes 196 and multiple atomic nodes 198. The user selected atomics are shown as shaded nodes.

This is the case where multiple groups (two groups in Fig. 9b) from different places in an

5   XHTML document, each containing varying number of items, need to be generalized. The groups do not generally have any relationship and so the only convenient way is to generalize the items from each group separately as shown above. Now, an example of the code input to the generalizer, an example of the code after generalization and an example of the final stylesheet that processes the elements in the groups in accordance with the invention are described.

10   Figures 10A - 10C illustrates more details of the second example of the generalization shown in Figures 9A - 9C including examples of the initial formatted code, the generalized code and the stylesheet used to generalize the multiple atomics. For example, Figure 10a is an example of a formatted code section 200 corresponding to the portion of the formatted code containing the information about the first generalized group "Specialty Sites" as shown in Figure

15   9B. In this example, the input formatted file may be an ARML file that may be used with the wireless web page generation system described above. Figure 10b illustrates a first portion 202 of code that is generalized code for the first group ("Specialty Sites") and a second portion 204 of code that is the generalized code for the second group ("Categories"). The generalized code from each portion may include xhtmlpath element that provides the information about how to locate

20   the atomics in the group. Figure 10c illustrates a portion 206 of the XSL stylesheet used for the wireless web page generation system to generate wireless web pages. The XSL stylesheet will